

The K2 M Dwarf Project: Campaign 4 and 5 Targets

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M dwarfs provide the highest probability of detecting small transiting planets by virtue of the large transit depths seen for such small stars. These deep transits also increase the potential for subsequent atmospheric characterization. The extended Kepler K2 mission provides the opportunity to monitor nearby, M dwarfs with precise photometry and discover a new population of small planets; including rocky and potentially habitable planets and sub-Neptunes with large atmospheres. We propose to observe more than 9000 M dwarfs in the K2 campaign 4 and 5 fields to continue our successful K2 program that we call the K2 M Dwarf Project (K2-MDP). We estimate ~100 small planets around the M dwarfs in fields 4 and 5 and ~400 from the full K2-MDP program. This new population of planets will drastically increase the number of known M dwarf planetary systems, improve planet frequency statistics, inform theories of planet formation, evolution, interiors, and atmospheres, and provide new targets for follow-up with current and future observatories.

Our M dwarf targets are selected from the SUPERBLINK proper-motion database and Pan-STARRS 1 catalog on the basis of proper-motion, photometric colors, and SED fitting. This selection method captures the majority of M dwarfs within 100pc of the Sun with little contamination. Our team exploits knowledge gained from analysis of Kepler light curves to search K2 pixel data for planet transit signals. Spectroscopic observations of candidate planet hosts will provide fundamental parameters such as temperature, metallicity, surface gravity, and age. Where feasible, new systems will be proposed as targets for radial velocity monitoring for full characterization. Our full program, from target selection, to planet discoveries, to host characterization, aims to provide the largest and most reliable sample of small, transiting M dwarf planets to date.

The proposed targets comprise a key portion of the K2-MDP program which aims to exploit the strengths of the K2 mission design to reveal hundreds of small planets around nearby M dwarfs. Discoveries of habitable zone, Earth-like planets and planets suitable for atmospheric characterization are primary science drivers for K2 and primary goals of NASA. Our program will provide both the small, rocky planets and key, well characterized, spectroscopy targets for early JWST GTO and Cycle 1 proposals months prior to the launch of TESS.